# B. N. Mandal University, Laboonagar, Madhepura

## Details of theory & Sessional Papers code of 2nd Year B. Tech. Course

## Branch: ELECTRICAL ENGINEERING

| | Subject | Subject Code | Branch Code | L | T | P | Th. Ext. | Th. Int. | Sessional |
|---|---|---|---|---|---|---|---|---|---|
| 01 | Mathematics-III | MA-III | EE-201 | 3 | 1 | 0 | 70 | 30 | -------- |
| 02 | Numerical Methods & Computational Techniques | NMCT | EE-202 | 2 | 1 | 3 | 70 | 30 | Numerical Methods & Computational Techniques 50 |
| 03 | Basic electronics | BE | EE-203 | 2 | 1 | 3 | 70 | 30 | Basic electronics 50 |
| 04 | Electrical machine-I | EM-I | EE-204 | 3 | 0 | 3 | 70 | 30 | Electrical machine-I 100 |
| 05 | Digital electronics | DE | EE-205 | 2 | 1 | 3 | 70 | 30 | Digital electronics 50 |
| 06 | Object oriented Programming | OOP | EE-206 | 2 | 1 | 3 | 70 | 30 | Object oriented programming-50 |
| 07 | Electrical machine-II | EM-II | EE-207 | 3 | 0 | 0 | 70 | 30 | Electrical machine-II 100 |
| 08 | Power system-I | PS-I | EE-208 | 3 | 0 | 0 | 70 | 30 | |

Expert-I (External)
Name:
Designation:
Address:

Expert-II (Internal)
Name:
Designation:
Address:

Dean
Faculty of Science & Engineering
BNMU, Madhepura

Principal
MIT
Rambagh
purnea

Member Secretary
Syllabus committee
BNMU
Madhepura

Subject: Mathematics-III Branch Code: EE-201 (EC/CS/EE/ME/CE/IT)

L-T-P: 3-1-0

First Term

1. **Ordinary differential equations & special functions:** Series solution of different [illegible] (Frobenious method), Bessel's equation, its solution, Bessel's function of first and [illegible] recurrence formula, Legendre's equation, its solution, Legendre polynomials, Rodrigue's formula, orthogonality of Legendre polynomial. Lecture
2. **Partial differential equation:** Basic concept, 1st & 2nd order linear & quasi- linear differential equation, classification of second order PDE, boundary and initial conditions, [illegible] equations, separation of variables, use of Fourier series, D'Alembert's solution of wave equation, Heat equation, solution by Fourier series. Lecture

Second Term

3. **Complex analysis-I:** Function of complex variables- limit, continuity, differentiability, analyticity of functions Cauchy-Reimann equations, Laplace's equation, harmonic functions, Cauchy's integral theorem, Cauchy's integral formula, Taylor's and Laurent series, residues, its applications to evaluating real integrals. Lecture
4. **Probability & Statistics:** Theorems on probability, including Baye's rule, random variables, cumulative distribution function, probability mass function, probability density function, mathematical expectation, mean variance, moment, generating function and characteristic function, standard probability model binomials, Poisson exponential, Weibull, normal, lognormal, sampling and sampling distribution, Chi-square and T-distributions, large and small sample tests of significance. Lecture

Text books:

1. Advanced engineering mathematics by R K Jain & S R K Iyengar.
2. Higher engineering mathematics by B S Grewal.
3. Fundamentals of mathematical statistics by V K Kapoor, & S C Gupta, Sultan & sons.

Reference books:

1. Advanced engineering mathematics by E Kreyszig 8th edition, John Wiley.
2. Complex variable and applications by Churchill & Brown, McGraw Hill.
3. Elements of partial differential equation by I N Sneddon, McGraw Hill.
4. Introduction to probability & statistics for engineering by S M Ross, John Wiley.

NUMERICAL METHOD & COMPUTATIONAL TECHNIQUE (CSE/EE/IMT/CF/eCE/IT)

BRANCH CODE-EE-202 L-T-P: 2-1-3

FIRST TERM

1. INTRODUCTION TO COMPUTER LANGUAGE:

Machine language, assembly language, high level language, compilers, problem solving using computer Algorithm, flowchart, examples lecture-03

2. C/C++ PROGRAMMING:

Constants & variables, arithmetic expression, i/o statement, specification statement, control statement, subscripted variables, logical expression, function and subroutines, examples of programming should include numerical as well as non numeric applications, matrix operation searching, sorting. lecture-21

SECOND TERM

3. ITERATIVE TECHNIQUE FOR SOLUTION OF EQUATION:

I.SOLUTION OF NON LINEAR EQUATION-simple iteration scheme, bisection method, Regula-falsi method, Newton-Raphson method, secant method, their rates of convergence, order of errors etc. lecture-12

II. SOLUTION OF LINEAR EQUATION-Gaussian elimination, matrix inversion by Gaussian method, computation of determinants, Jacobi and Gauss - Seidal iteration method

Lecture-06

4. POLYNOMIAL APPROXIMATION: interpolation,several form of interpolating polynomials like Lagrangian interpolation of polynomial and Newtons forwared and backward difference formula,curvefitting(least square) lecture-04

5 NUMERICAL INTEGRATION: Trapezoidal method , Simpsons' rule($1/3^{rd}$ and $3/8^{th}$ ) order of errors in integration. lecture-04

6. SOLUTION OF INITIAL VALUE PROBLEMS: Euler's method, Runge – kutta second order and fourth order methods (without proof), solution of boundary value problem-finite difference method. Lecture-05

TEXT BOOK:

1. NUMERICAL METHODS FOR SCIENTIFIC FOR ENGINEERING COMPUTATIONS BY M.K JAIN, S.R.K IYENGAR AND R.K JAIN, NEW AGE INTERNATIONAL PUBLISHERS, NEW DELHI

2. INTRODUCTORY METHOD OF NUMERICAL ANALYSIS BY S.S SASTRY, PHI PVT. LTD.

REFERENCE BOOKS

1. NUMERICAL ANANLYSIS IN ENGINEERING BY RAMA B. BHAT, S.CHAKRAVARTY, NAORSA PUBLISHING HOUSE

2. ADVANCED ENGINEERING MATHEMATICS BY E.KREYSZIG, 8th EDITION BY JOHN WILLEY & SONS, NEW YORK

CT LAB

WORKING in WINDOWS ENVIROMENT,FORTRAN 77 PROGRAMMING BASED ON SYLLABUS

Subject: Basic Electronics Branch Code: EE-203 (ECE/CSE/EI/ME)

L-T-P: 2-1-3

First Term:

1. **PN junction diode**: Semiconductor, Depletion layer, barrier potential, forward and reverse breakdown voltage, PIV, characteristics of PN junction diode, knee voltage, ideal PN junction, junction capacitance, breakdown diode (zener diode). Lectures
2. **Rectifiers and filters:** Half wave and full wave rectifiers (centre tapped and bridge), regulation, ripple factor, elementary theory of filter, L, C, L-C, and π filters. Clipping and clamping circuits, voltage multiplier. Lectures
3. **BJT introduction:** Basic theory and operation of PNP and NPN transistors, characteristics of CE and CC configurations and determination of α, β, γ and their relations. Lectures

Second Term

4. Biasing: Base bias, emitter feedback bias, voltage divider bias, load line, operating point, incremental analysis using h-model. Lectures
5. **FET:** Introduction, operation, JFET parameters, JFET characteristics, JFET amplifiers. **MOSFET:** Introduction, operation, MOSFET parameters. Lectures
6. **Feedback amplifiers:** Theory of feedback amplifier, positive and negative feedback, feedback topologies, feedback amplifiers. Lectures
7. **Integrated circuits:** Characteristics of ideal op-amp. Application as inverting, non-inverting amplifiers, summer, difference, differentiator, integrator. Lectures
8. **Principle and applications** of SCR and UJT. Lectures

Text Books:

1. Electronic devices and circuits theory by Boylestad and Nashelsky, Pearson.
2. Electronic principles by Albert Malvino and Davis J Bates, TMH.
3. Art of Electronics by Paul H Horowitz.

**Reference:**

1. Introduction to electronic circuit design by Spencer, Pearson.
2. Device electronics for integrated circuits by Muller and Kamins with Masun Chan, Wiley eastern edition.
3. Principles of electronics by V K Mehta and Rohit Mehta, S Chand.
4. Electronic circuit and system by R J Smith, Wiley.

**Basic Electronics Lab:**

1. Introduction to DMM (Digital multimeter)
2. Introduction to passive components (resistor, capacitor, and inductor)
3. Introduction to CRO- time period measurement, study of different wave forms, measurement of frequency of sinusoidal waveforms by Lissajou's figure.
4. Introduction to connectors- multi strand wires and single strand wires and bread boards.
5. Study of output characteristics of diode, BJT, FET, UJT, SCR.
6. Application of diodes, BJT, FET, UJT and SCR, clipping and clamping, rectification, RC coupled CE and CS-FET amplifiers, relaxation oscillators.
7. Application of μA 741 inverting amplifiers, summer amplifiers, difference amplifiers, integrator and differentiator.

**Text Book:**

Lab manual by Maheshwari, PHI.

Subject: Electrical Machines-I Branch Code: EE 204 (EE/ECE)

L-T-P: 3-0-3

First Term

1. DC Generator: Constructional Feature and types of D.C Machines, Types of armature winding, Action of Commutator, Principle of operation of D.C Generator, Induced EMF, Armature reaction, Commutation, Compensating Winding and Inter poles, External and Internal Characteristics of D.C Generator, Critical Resistance, Critical speed.
   Lecture 10.
2. D.C Motor: Principle of D.C Motors, Back EMF, Torque and Speed characteristic of DC Motors, Losses and efficiency.
   Lecture 6
3. Single Phase Transformer: Basic Principle, Types and Construction of Single Phase Transformer, EMF equation, Equivalent circuits, phasor diagram, Losses and efficiency Testing, Voltage Regulation, per unit system, Losses and Efficiency, parallel Operation of Single Phase Transformer .
   Lecture 10.

**Second Term**

1. Auto Transformer: working Principle, Saving of conductor, Advantage and Disadvantage of Auto Transformer.
   Lecture 4.
2. Three Phase Transformer: Introduction, Types, Phasor group, Parallel Operation of three phase Transformer, Cooling of Transformer.
   Lecture 4.
3. Three phase Induction Motor: Construction, Types and Principle of Operation of three phase induction Motors, Production of rotating magnetic field, slip, Equivalent Circuit and Phasor Diagram, Mechanical Power Developed, Maximum torque, Torque-slip characteristics, Losses and efficiency, Starting, Testing and speed control of 3-phase induction Motor
   Lecture 12

Text Book:

1. Elerctrical Machine by Samarjit Ghosh, Pearson Education Pvt. Ltd.
2. Electrical Machine by P.S bimbara, Khanna Publication.
3. Electrical Machine by Nagrath, I.J and Kothari D.P T.M.H

Reference Book:

1. Electrical Machinery by Fitzgerald A.E $Kingsley TMH
2. Direct Current Machine by E.W Dawsing

**Electrical Machine I Lab**

Practical Based On Syllabus

Subject: Digital Electronics  Branch Code: EE-205  (ECE/CSE/EE)

L-T-P: 2-1-3

First Term

1. **Digital principle:** Analog vs Digital, number system, computer codes, digital signals, waveforms, positive and negative logic, Logic Gate: basic, universal and others, truth table, logic families, chips, timing diagram, electrical analogy. Lectures
2. **Boolean laws and theorems:** Logic functions, conversion of logic functions into truth table and vice versa, SOP and POS forms of representation, min terms and max terms, simplification of logic functions by theorems and Karnaugh's map, don't care conditions, design of special purpose computers and related practical problems. Lectures
3. **Analysis and synthesis of combinational logic circuits:** Adder and Subtractors, multiplexers, demultiplexers, encoders, decoders, code converters, magnitude comparators, parity generators and checkers. Lectures
4. **Integrated circuit logic families:** RTL, DTL, TTL, CMOS, IIL, ECL. Lectures

Second Term

5. **Sequential circuit blocks and latches:** flip-flops- rat-race condition, master slave and edge triggered, SR, JK, D & T flip flops, shift registers, counters- synchronous and asynchronous design of ripple counter. Lectures
6. **Timing circuits:** Multivibrators: monostable and astable, timer IC 555. Lectures
7. **Use of building blocks** in designing larger systems such as digital to analog converter (DAC) weighted resistor and r-2r, analog to digital converter (ADC) comparator, counter and successive approximation. Lectures
8. **Memories:** Static and dynamic RAMs, ROM, EPROM, EEPROM. Lectures

Text books:

1. Digital systems principles and applications by Tocci, Widmar and Jain, Pearson.
2. Digital fundamentals by Floyd and Jain, Pearson.

Reference books:

1. Fundamentals of VHDL design by Stephen Brown and Zovenkeo Vraseseic, TMH.
2. Introduction to logic design with cd ROM by Alan B Marcovity, TMH.
3. Fundamentals of digital logic with Verilog design by Stephen Brown TMH.
4. Modern digital electronics by R P Jain TMH.

**Digital Electronics Lab:**

1. Realization of logic gates including the universal gates.
2. Realization of the Boolean algebra.
3. Realization of the different logic circuits.

OBJECT ORIENTED PROGRAMMING (CSE/EE/ECE/CE/IT)

BRANCH CODE-EE-206 L-T-P 2-1-3

FIRST TERM

1.INTRODUCTION TO C++

Object oriented technology, advantages of OOP, input-output in C++,tokens, keywords, identifiers, data types C++, derives data types, the void data types, type modifiers, typecasting, constant, operator, precedence of operators, strings lecture-02

2. CONTROL STRUCTURES

Decision making statements like if-else, nested if-else, goto , break, continue, switch case, loop statement like for loop, nested for loop, while loop, do-while loop lecture-1

3. FUNCTIONS:

Parts of function, user-defined functions, value-returning functions, void functions, value parameters, function overloading, virtual functions lecture-05

4. CLASSES AND DATA ABSTRACTION:

Structure in C++,class, build-in operations on classes, assignment operators and classes,classes scope, reference parameters and class objects, member functions, Accessor and Mutator functions, constructors, default constructor, destructors lecture-0

SECOND TERM

5. OVERLOADING & TEMPLATES:

Operator overloading, function overloading, function templates, class templates lecture-05

6. INHERITANCE:

Single and multiple inheritance, virtual base class, abstract class, pointer and inheritance , overloading member function, lecture-0

7. POINTERS NAD ARRAYS

Void pointers , pointer to class ,pointer to object ,the this pointer , void pointer, Arrays lecture-0

8. EXCEPTION HANDLING:

The keywords try, throw and catch, creating own exception classes, exception handling techniques (terminates the program, fix the error and continue, log the error and continue), stack unwinding lecture-12

TEXT BOOKS:

1. THINKING IN C++, VOLUME 1 & 2 BRUCE ECKEL, CHUCK ALLISON,
2. MASTERING IN C++

REFERENCE BOOKS:

1. THE C++ PROGRAMMING LANGUAGE 3/E BY STROUSTRUP PERASON
2. BIG C++ BY CAY HORSTMANN, WILEY INDIA

PROGRAMMING LAB (OOP)

WRITING PROGRAMS USING CLASSES AND OBJECTS, CONSTRUCTORS AND DESTRUCTORS, INHERITANCE PROPERTIES, OVERLOADING OPERATORS, USE OF POINTERS LIST REPRESENTATION, PROGRAMS AND VIRTUAL FUNCTIONS,FILE HANDLING, I/O MANIPULATORS USING C++

Subject: Electrical Machine-II Branch Code: EE207 (EE)

L-T-P: 3-0-3

First Term

1. Synchronous Generator: Principle, Construction and types of synchronous machines, Methods of excitation, Armature windings, EMF Equation of Alternator, Armature reaction, testing (OC and SC test) Voltage Regulation, Phasor Diagram. Lecture:14
2. Two Reaction: Theory Modify Phasor Diagram, Power angle characteristics, Parallel operation, Effect of change of voltage supply and excitation on alternator connected to infinite bus, cooling of synchronous Generator. Lecture:8

Second Term

3. Synchronous motor: Principle of operation, equivalent circuit, effect of varying field current, V-curves, Inverted V-curves, Phasor diagram, starting of synchronous motors, Hunting ,application. Lecture:8
4. Single phase induction motors: Introduction, Working principle, double revolving field theory, Equivalent circuit, Starting method and types of single phase induction motor, Application. Lecture:8
5. Special motors: Single phase Synchronous motor, Two Phase AC Servo motor, single phase series motor (universal motor),stepper motor, Permanent magnet DC motor, Application. Lecture:8

Text Books:

1. Electrical machines by Nagrath I.J. and Kothari D.P. TMH
2. Electrical machinery by Fitzgerald A.E.& Kingsley

Reference Books:

1. Electrical Machines by P.S. Bhimra, Khanna Publication.
2. Electrical Machines by Samarjeet ghosh, Pearson Education Pvt Ltd.

Electrical Machine-II Lab

Practical Based On Syllabus